HEAD GATE HOISTS

S. MORGAN SMITH CO.
YORK, PA., U. S. A.

BULLETIN OF

HEAD GATES, GATE HOISTS AND VALVES

BULLETIN 180 SEPTEMBER, 1910

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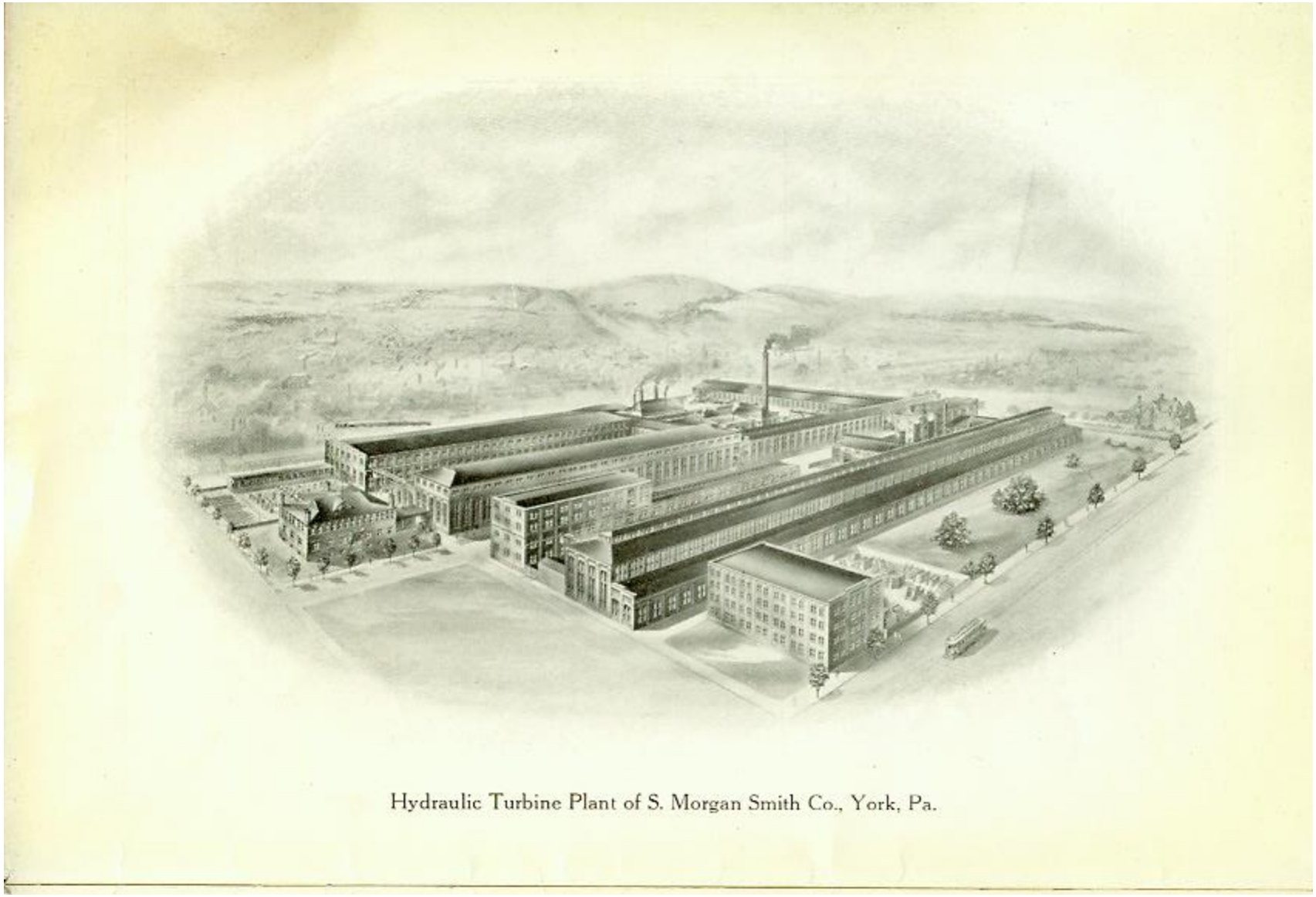


Hydraulic Turbine Plant of S. Morgan Smith Co., York, Pa.

INTRODUCTORY

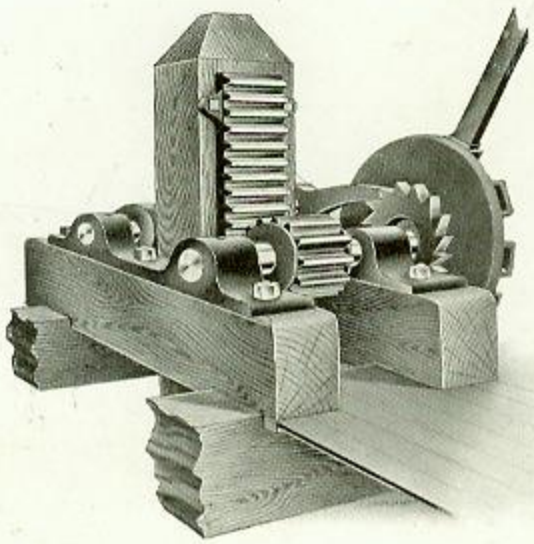
¶ In presenting this Bulletin to the public we have endeavored to describe the head gates of Standard design and head gate hoisting apparatus which we have manufactured for the past twenty-five years and all of which have proven their reliability in actual service.

¶ It is a known fact that in former years not enough thought or attention has been paid to this important feature of a power plant. It is true that head gates and their operating machinery are not in use very often, but we believe every owner or operator of a water power plant will realize the importance of having apparatus which they can depend upon to do its work promptly and without danger of being out of order when most needed. It is with this end in view that we have designed the various style hoists shown in this Bulletin, and with the large corps of engineers in our employ who have had practical experience in this line, we know we have succeeded in developing the best designed apparatus now on the market.

¶ Another important point which should be given consideration is the capacity of the hoist required. Do not use a hoist which is too light for the work required of it, as this will surely mean trouble and expense.

¶ In addition to the hoists shown on the following pages we have numerous other patterns, and are prepared to design hoists for any special work. We recommend that prospective customers advise us the size of the gate opening in the clear, the distance from the center of the gate opening to the surface of the water, and whether a filler gate can be used to equalize the pressure on the gates. With this information we can readily advise the style hoist, gate or valve to use.

S. MORGAN SMITH COMPANY

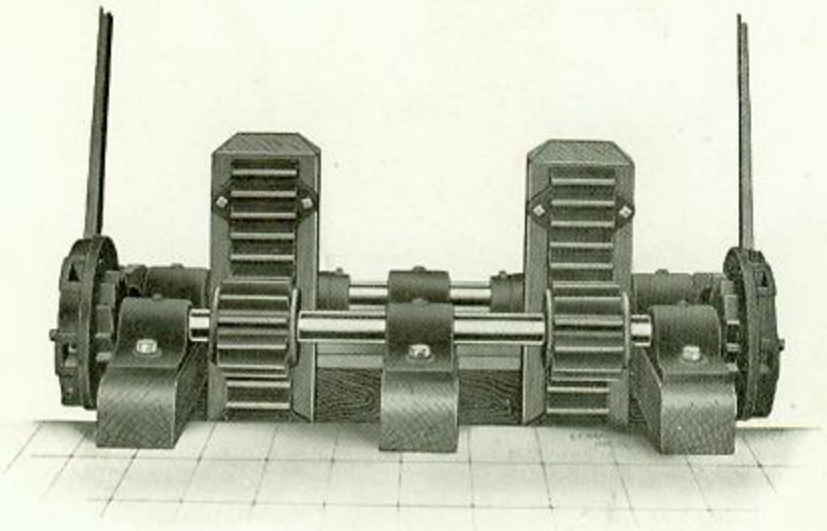


ENGRAVING 170

Represents the type "A" and "B" Hoist. A winch wheel is attached to the pinion shaft and is operated by a lever.

As will be observed from the engraving, there is a heavy spur pinion working into the rack segment which is bolted to the gate stem. The pinion and roll shafts are held firmly in position by means of journals cast in connection with heavy plates securely bolted to a wooden frame.

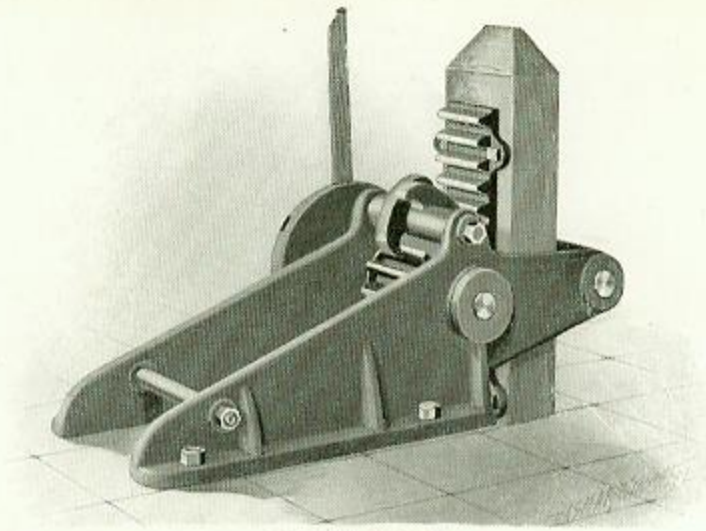
See page 25 for general dimensions and capacity of "A" hoist, and page 27 for "B" hoist.



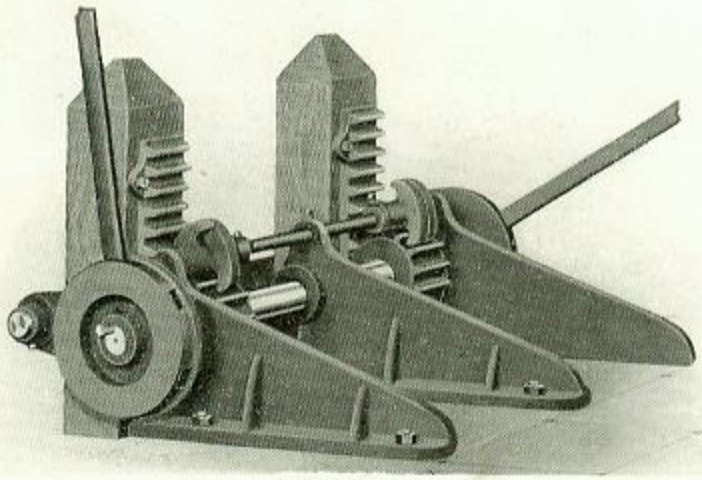
ENGRAVING 171

Represents the type "AA" Hoist. This Hoist is similar to the Style "A" Hoist, except that it is fitted with two pinions for double stems on the gate.

See page 26 for general dimensions and capacity.



ENGRAVING 172

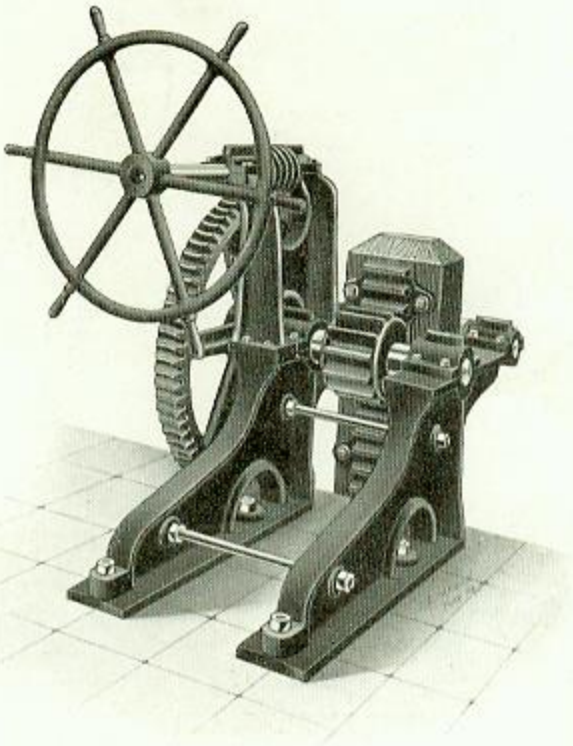


ENGRAVING 173

The above engravings represent the type "C," "D" and "H" Hoist; also the "HH" Hoist. The type "C," "D" and "H," engraving 172, are each arranged for single stem and have different capacities. They are operated by a lever and winch wheel.

The type "HH" is arranged for double stems and has twice the capacity of the type "H."

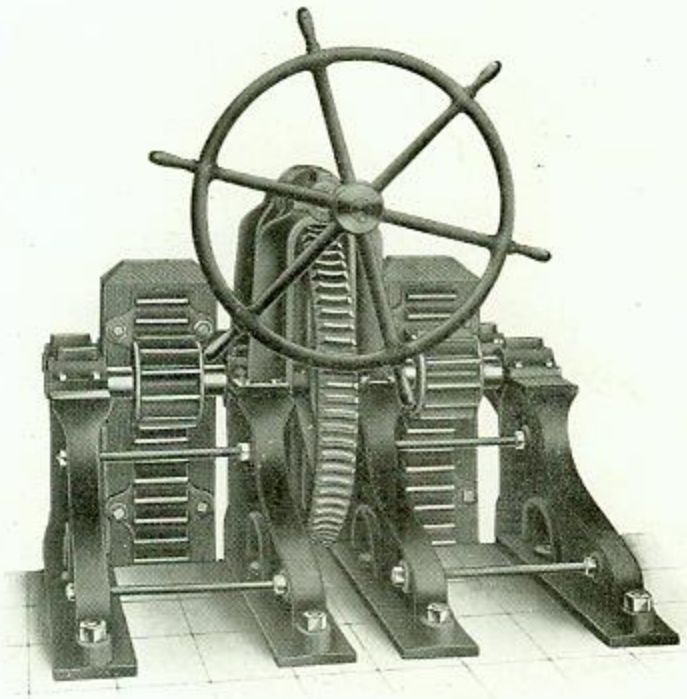
See page 28 for general dimensions and capacity of the "C" Hoist; page 29 for the "D" Hoist; page 30 for the "H" Hoist, and page 31 for the "HH" Hoist.



ENGRAVING 174

Represents the types "E," "F" and "L" Hoists. The pinion shaft is operated by means of a worm and worm wheel. The different styles are of the same design but have different capacities.

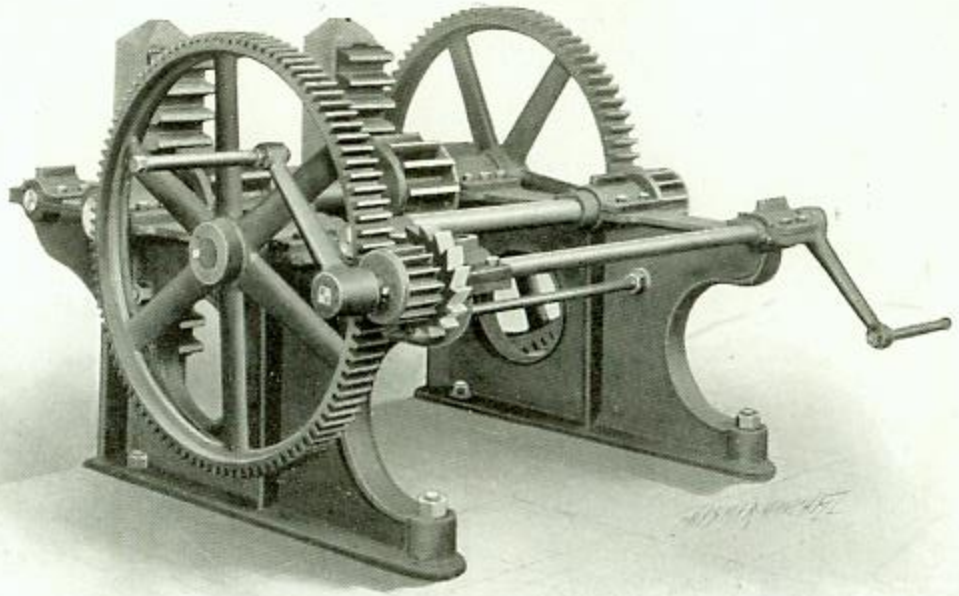
See page 32 for general dimensions and capacities.



ENGRAVING 175

Represents the type "EE," "FF" and "LL" Hoist, and are fitted with two pinions for operating gates with double stems. Worm and worm wheel transmission are used making a very powerful hoist.

See page 33 for general dimensions and capacities.

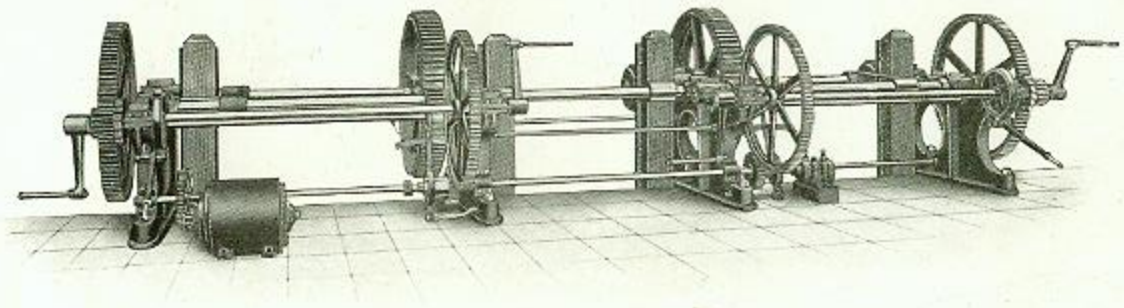


ENGRAVING 176

Represents the type "KK" and "QQ" Hoist. This is a double geared Hoist with two pinions for double gate stems. It has all spur gear transmission and is a very powerful Hoist.

This same style Hoist is furnished triple geared with cast steel gears and rack with a capacity of 60,000 pounds for both stems. This type is also built for single stems when desired.

See page 36 for general dimensions and capacity of the "KK" Hoist, page 37 for dimensions and capacity of the "Q" Hoist, and page 38 for the "QQ" Hoist.



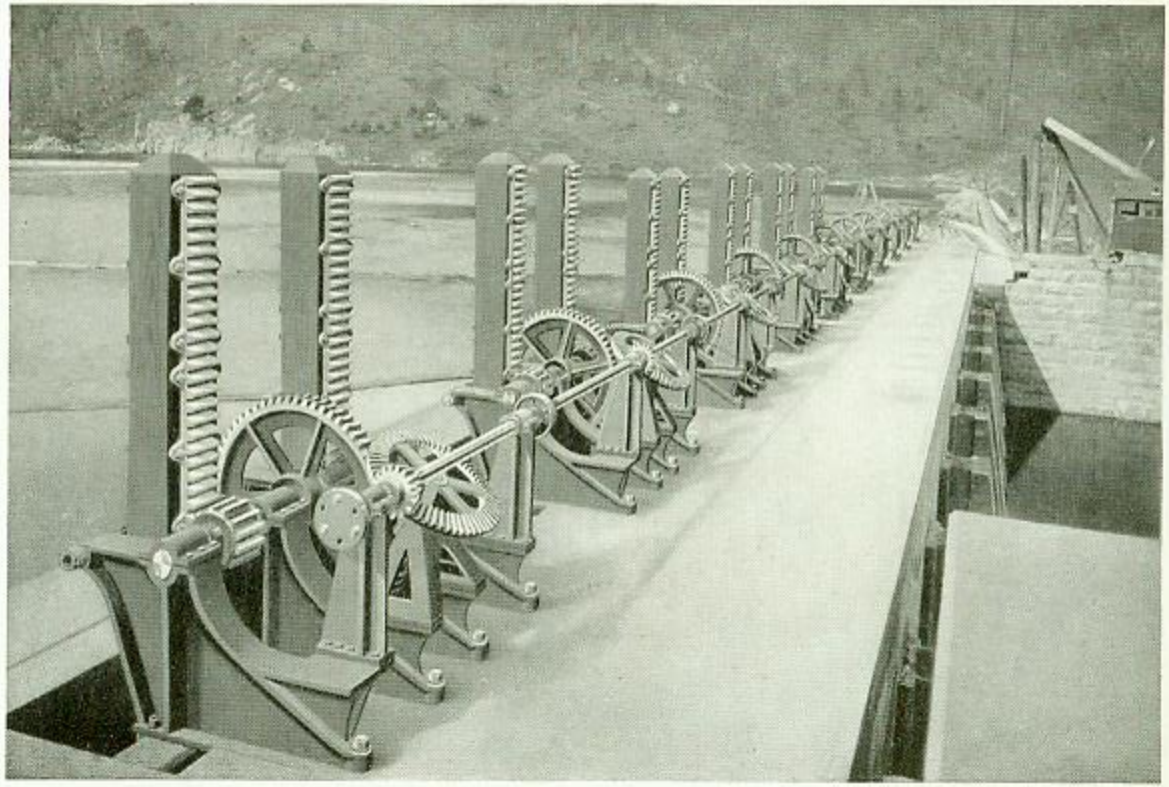
ENGRAVING 177

Represents the type "KK" Hoist arranged to be electrically operated. We make a specialty of designing and building hoists to meet requirements, and can arrange the majority of our other type hoists for electrical operation when desired.

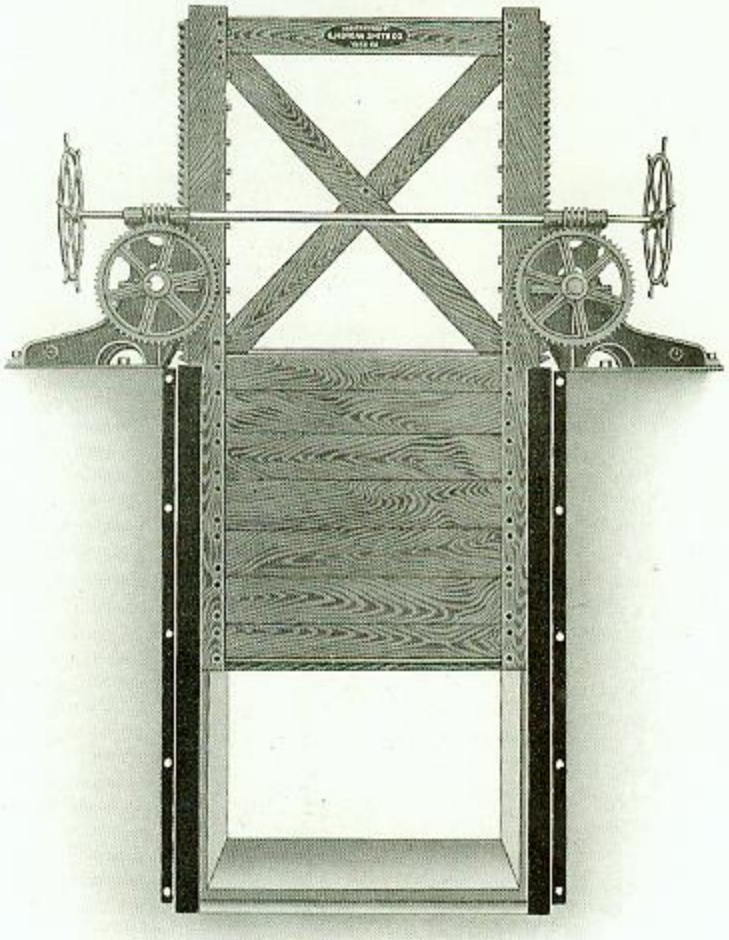
ENGRAVING 178

Represents an installation using a type "R" Hoist. This is a very powerful Hoist, so arranged that it may be operated by hand or power. Pin clutches are used for connecting the driving shaft to the operating mechanism. The hoist is equipped with two pinions for double gate stems and has worm and worm wheel transmission. See page 39 for capacity and general dimensions.

Ten (10) complete Hoists, as shown, were furnished the Hudson River Electric Power Company for their Spiers Falls Plant.

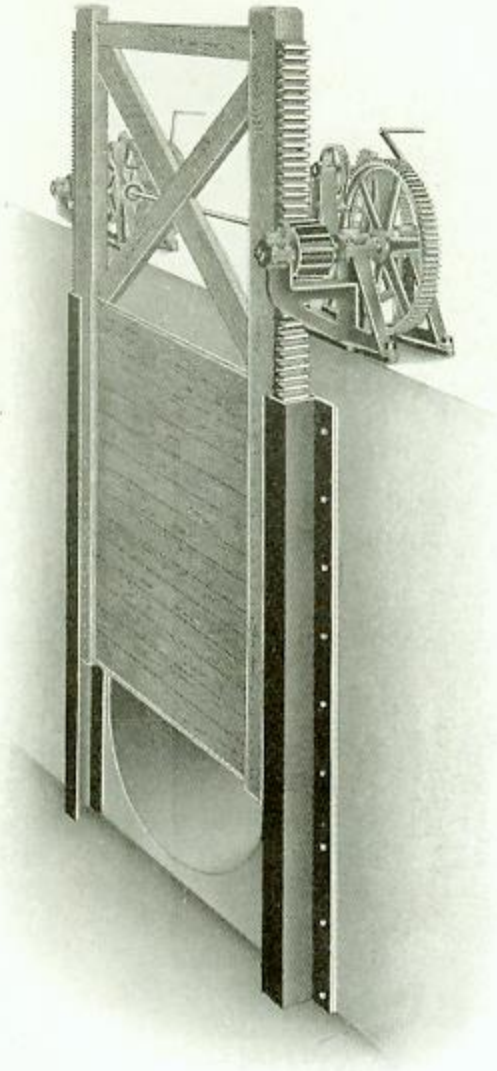


Sixteen (16) complete Hoists were furnished the Southern Power Company: (8) for their Great Falls Plant, and (8) for their Rocky Creek Plant.



ENGRAVING 179

Represents a special Hoist for which we can use type "E," "F" and "L" patterns, and is used for large gates under low heads. It has the same capacity as the "EE," "FF" and "LL" Hoists.

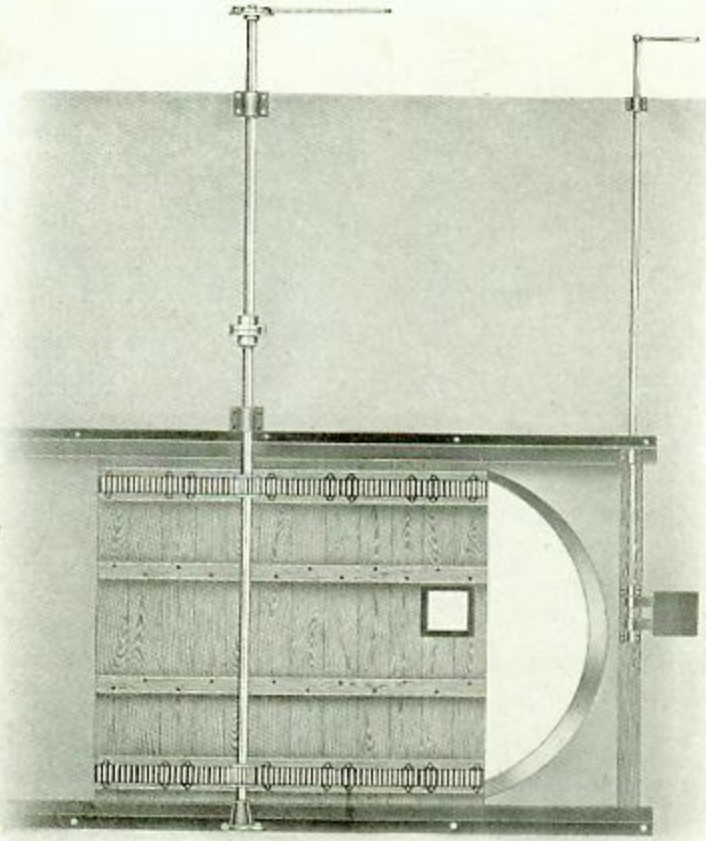


ENGRAVING 180

Represents the type "O-1" Hoist. This Hoist is used on large gates under a low head, and has spur gear transmission.

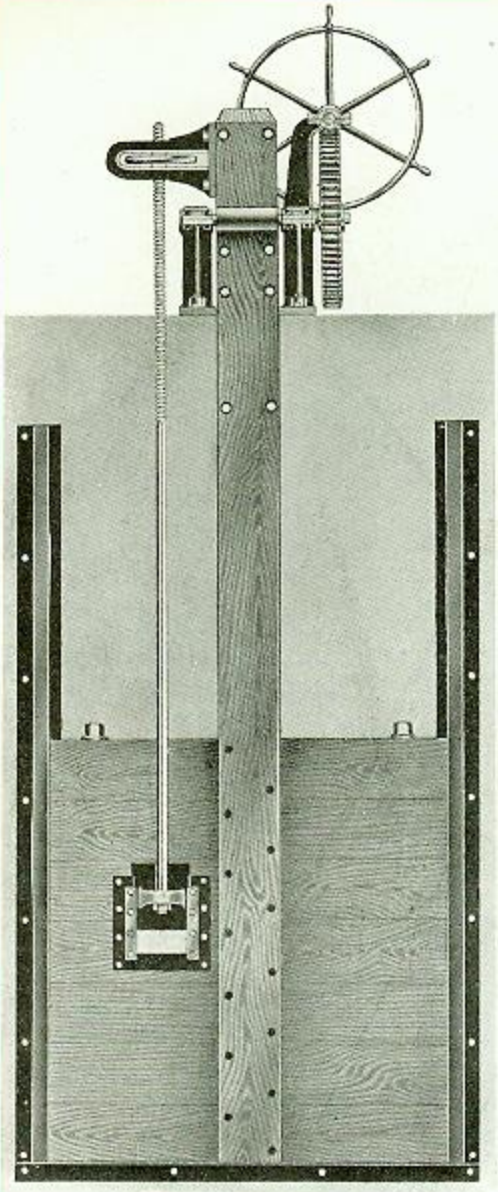
The type "O-2" is similar to the "O-1" Hoist, except that it is equipped with worm gear transmission. "O-1" and "O-2" have the same capacity.

See page 35 for general dimension and capacity of the type "O-2" Hoist.

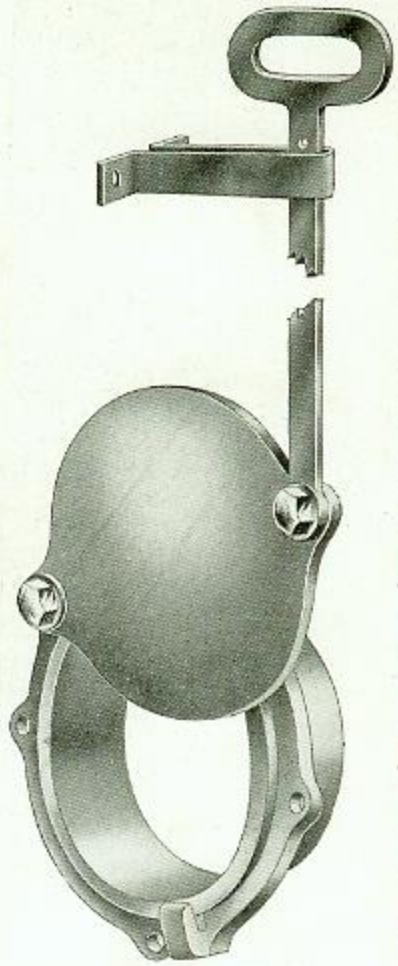


ENGRAVING 181

Shows the lateral moving gate which is sometimes used under low heads. There are two (2) racks bolted to the top and bottom part of the gate into which mesh two (2) pinions. The pinion shaft extends above the head water and is operated by means of a bar and winch wheel as shown on the engraving. The filling gate shown to the right of the engraving is fast to the frame and when the gate is in a closed position, the filling gate cover is turned by means of a vertical stem until it closes the opening in the large gate. This is an inexpensive head gate arrangement.

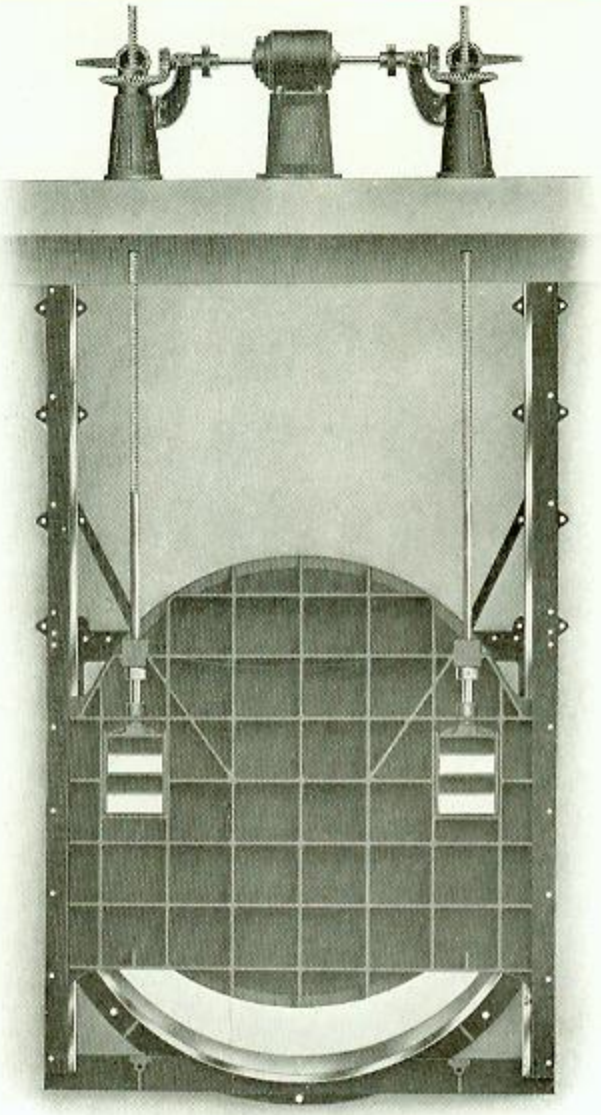


ENGRAVING 182



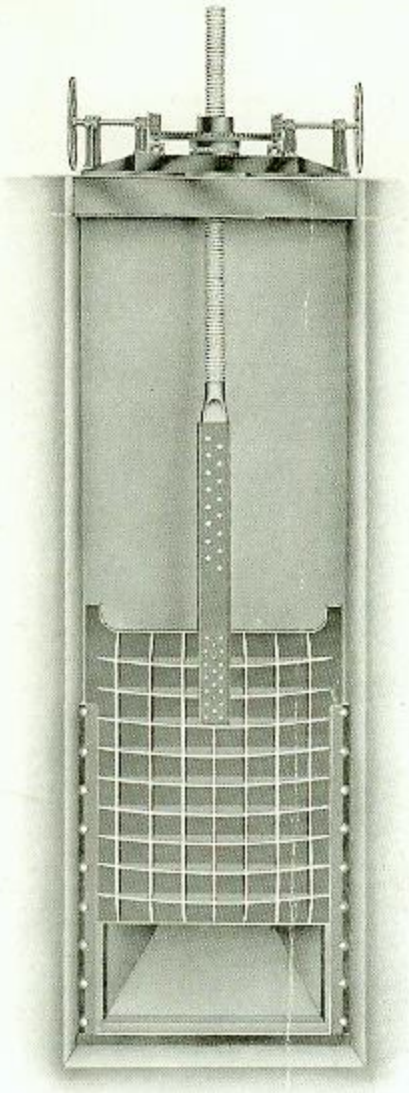
ENGRAVING 183

The above engravings represent two styles of filling gate. Either of these gates can be placed on a large gate so that by opening the filling gate the water can pass through the large gate and fill the flume or waterways behind same so that when the large gate is lifted the water will be at the same level on either side of it, and there will be practically no load to lift due to the water pressure; the weight of the gate only to be lifted, and, consequently, a smaller hoist can be used. The engravings illustrate very clearly the manner of attaching the filling gate.



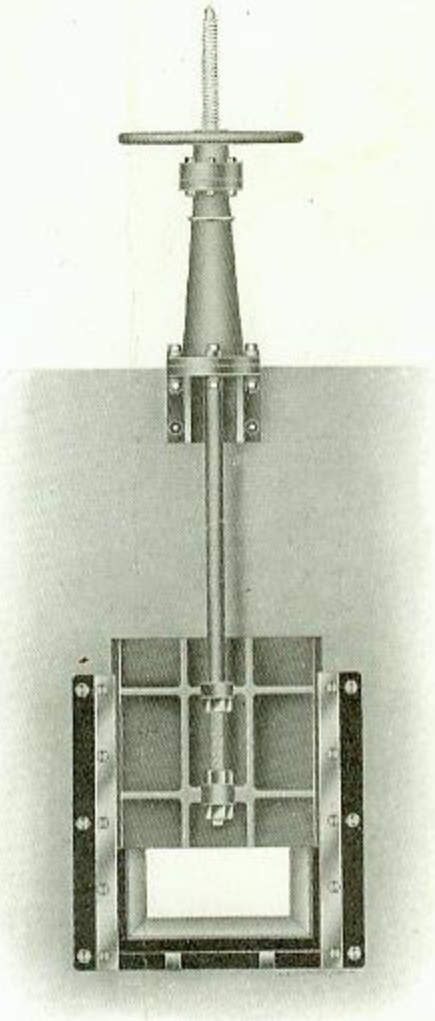
ENGRAVING 184

Represents a ten foot gate and hoist for same, five of which were built for the U. S. Government. These gates are operated by an electric motor and are so arranged that when the gates are raised to the proper height, the motor is stopped automatically. The filling gates are of a special design and are attached to the main stems. We make a specialty of building gates and hoists for all kinds of service and conditions.



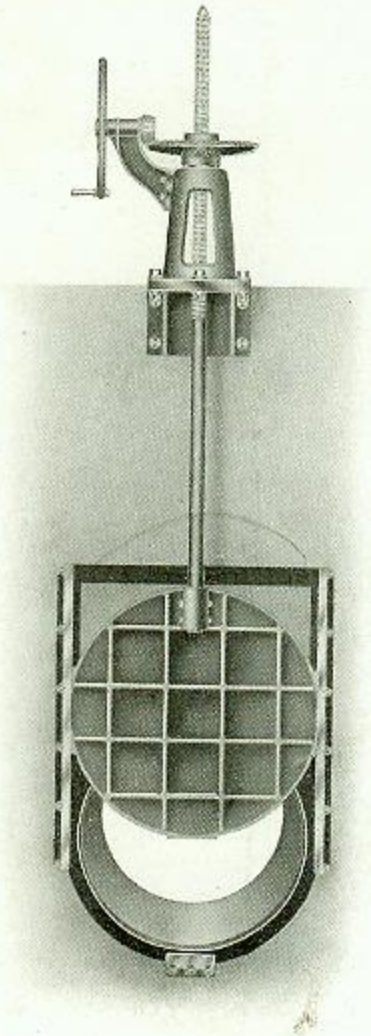
ENGRAVING 185

Represents a waste or sand gate as frequently placed in dams or raceways so that the silt or sand can be washed away by the current.



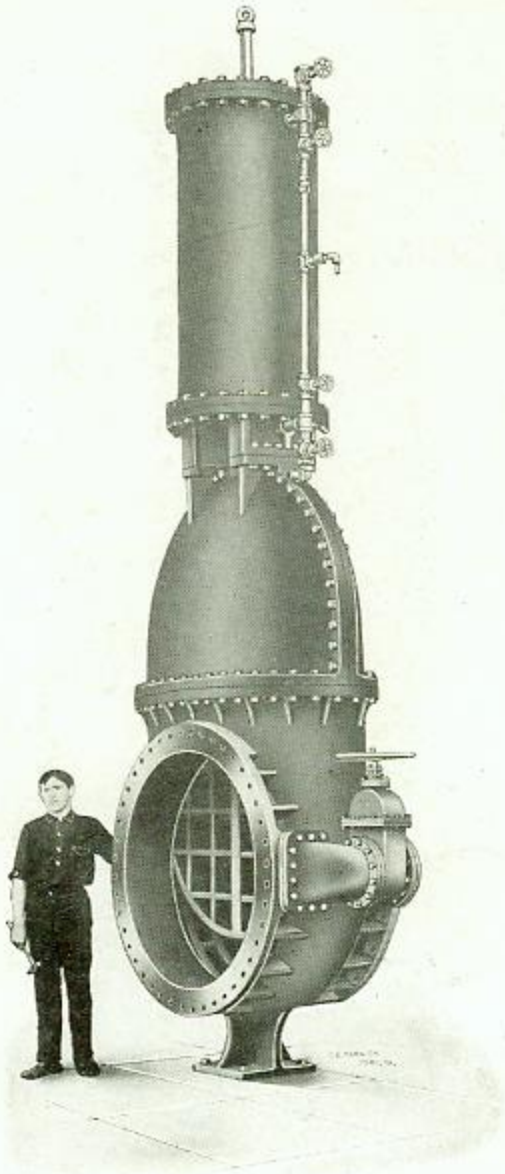
ENGRAVING 186

Engraving 186 represents one of many types of sluice or head gate for which we have patterns. The gate is rectangular and heavily ribbed and has a steel stem with screw which is operated by a hand wheel as shown. This is an ideal gate and hoist for small pipes under a medium head.



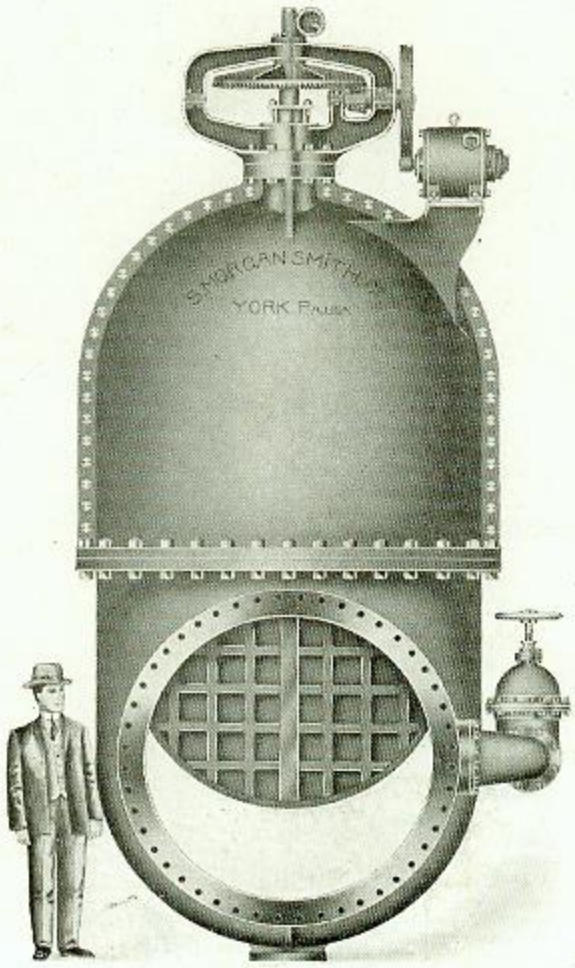
ENGRAVING 187

Engraving 187 represents another type of sluice or head gate. The gate is a round disc, heavily ribbed, and has a steel stem with screw which is operated by a bronze nut, mounted on a ball bearing, and driven by means of a pair of bevel gears and hand wheel or crank. It is often arranged with two bevel pinions and cranks. This is an ideal gate hoist where the inlet is over 15 feet below the head water. Engraving 210 shows one of these gates at the inlet of a steel feeder.



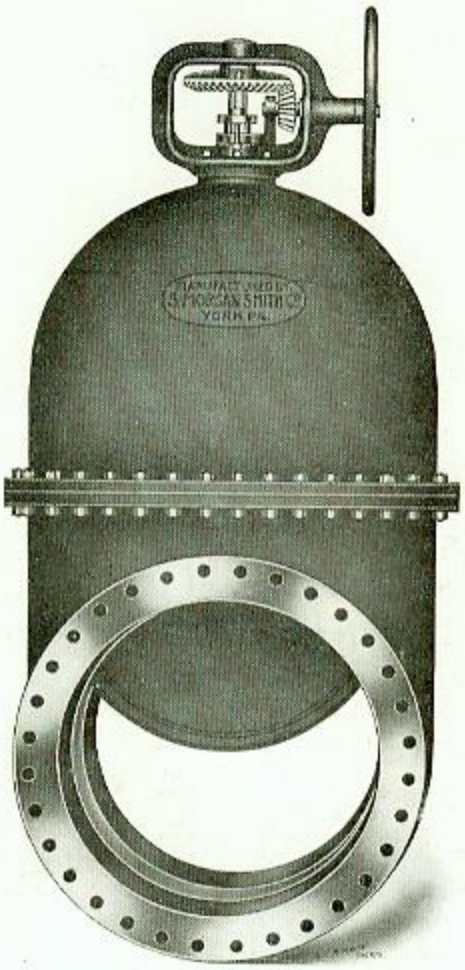
ENGRAVING 188

Represents a 48-inch hydraulic operated gate valve with by-pass. Four (4) of these valves were furnished the U. S. Government and are installed under a head of 220 feet. We make hydraulic valves of all sizes for any pressure.



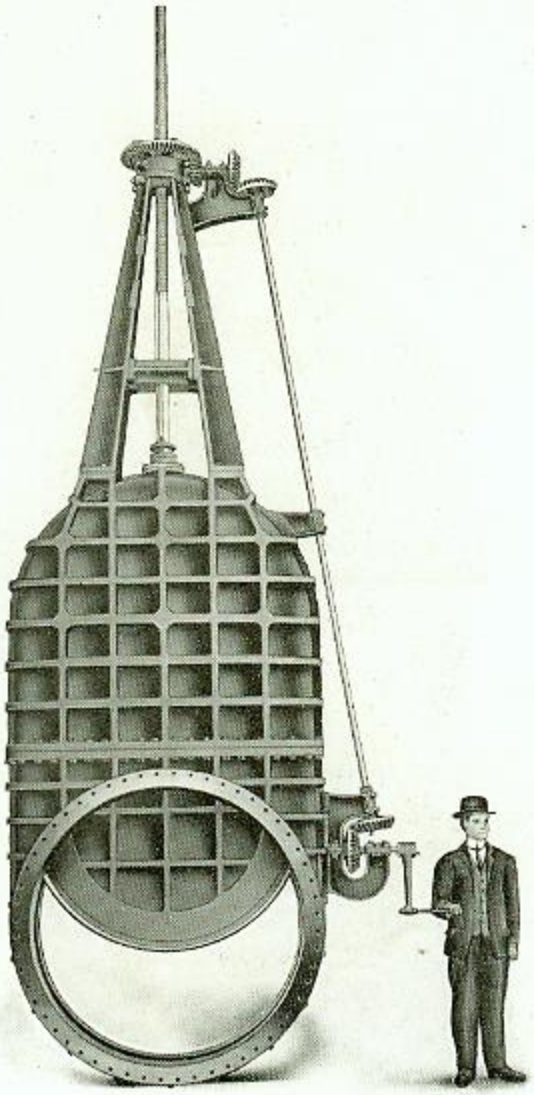
ENGRAVING 189

Represents an electrically operated gate valve. Four (4) of these valves 60" in diameter were furnished the Negoya Electric Company, Japan, and are operating under a 150-ft. head. We make these valves all sizes to meet requirements.



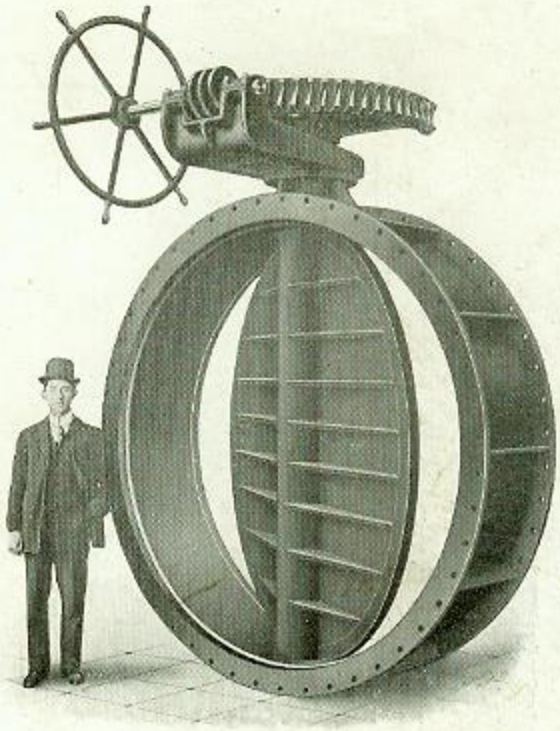
ENGRAVING 190

Represents our standard inside screw gate valve for turbine penstocks. We have a complete line of patterns for these valves 6" and upwards.



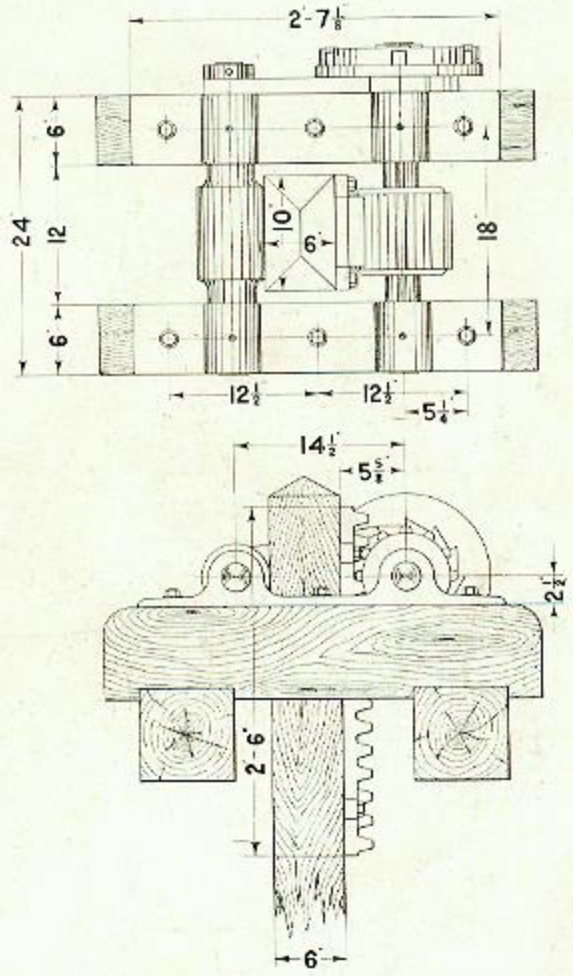
ENGRAVING 191

Represents a standard outside stem gate valve. This type of valve is used where the water is saturated with sand or grit and the use of an inside screw would not be advisable. We make this valve in all sizes.



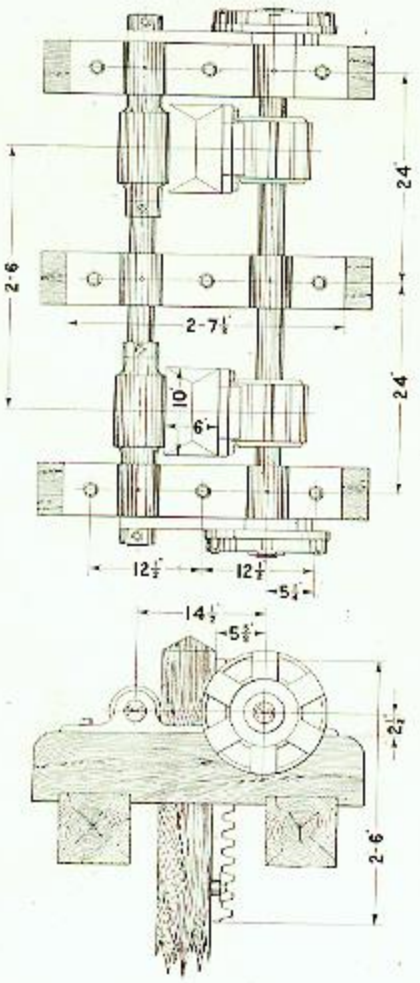
ENGRAVING 192

Represents a flutter gate valve. This valve is now used for any head and is so built that the leakage is very small. It is less expensive than the regular gate valve. We have patterns for this type of valve from 8" upwards.



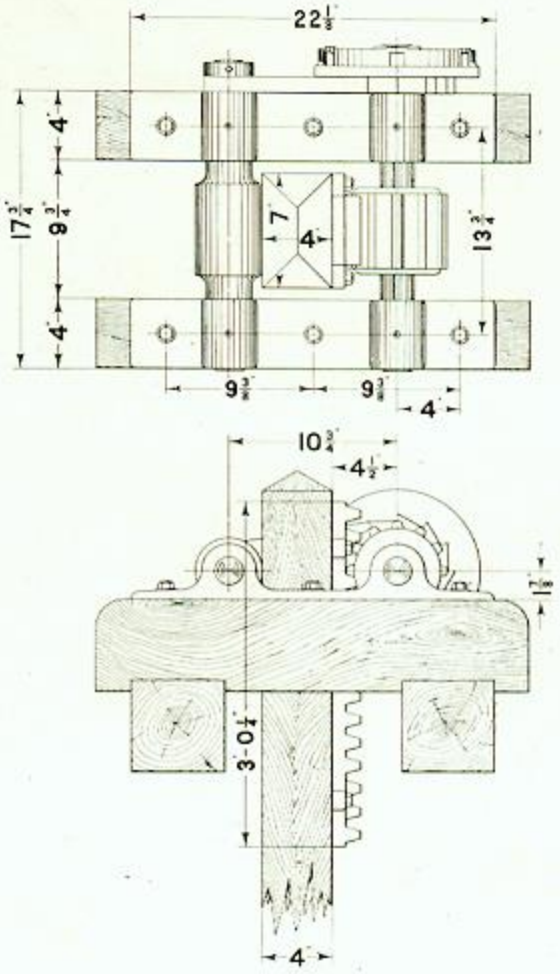
ENGRAVING 193

Dimensions of the Style "A" Hoist.
Maximum capacity 5000 pounds.



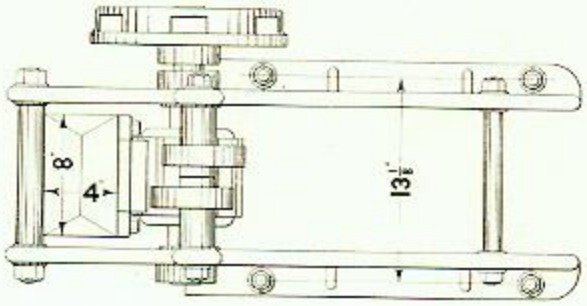
ENGRAVING 194

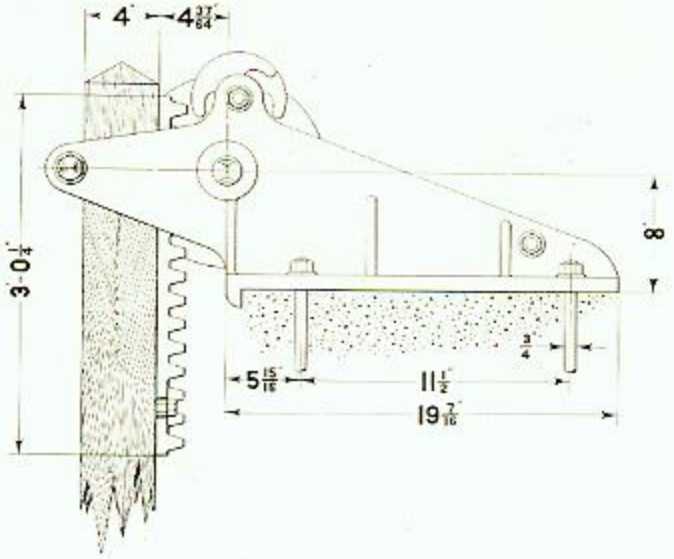
Dimensions of the style "AA" Hoist.
Maximum capacity 10,000 pounds, for two stems.



ENGRAVING 195

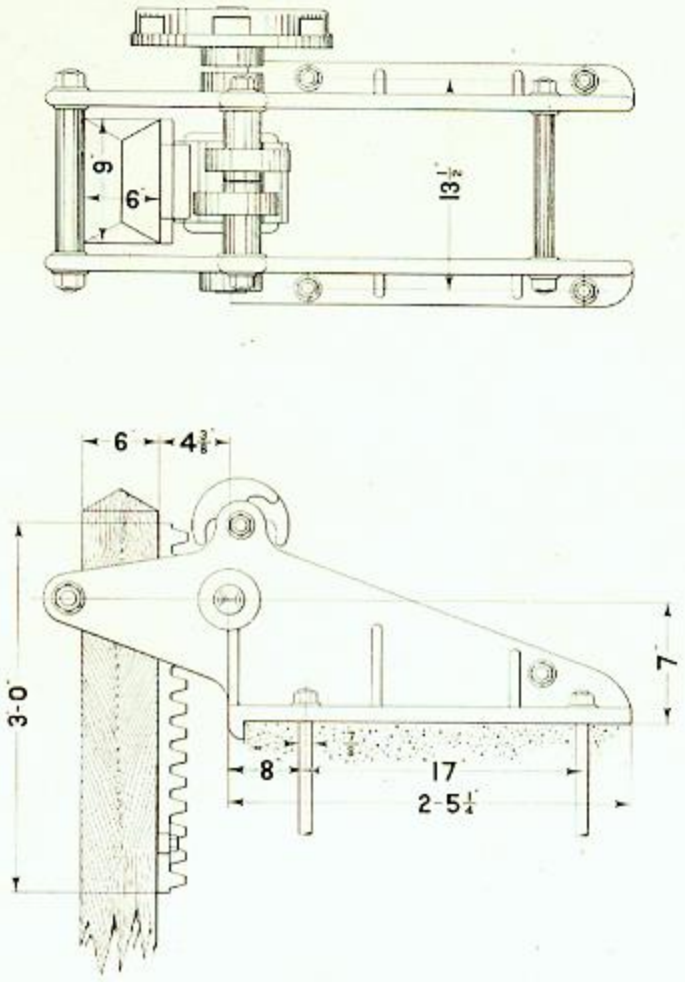
Dimensions of the Style "B" Hoist.
Maximum capacity 1900 pounds.





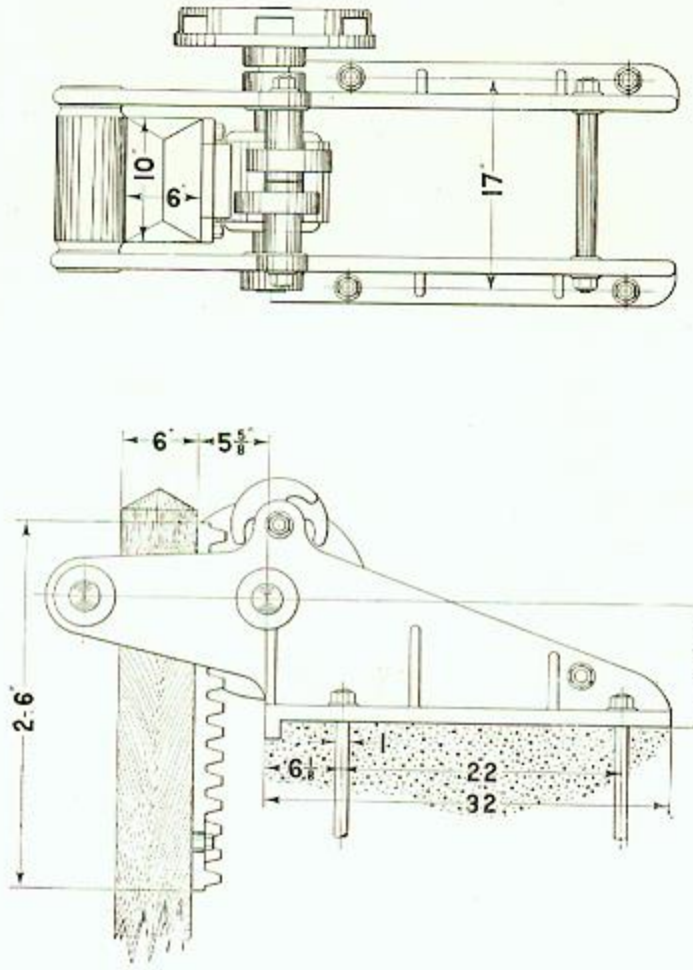
ENGRAVING 196

Dimensions of the style "C" Hoist.
Maximum capacity 1900 pounds.



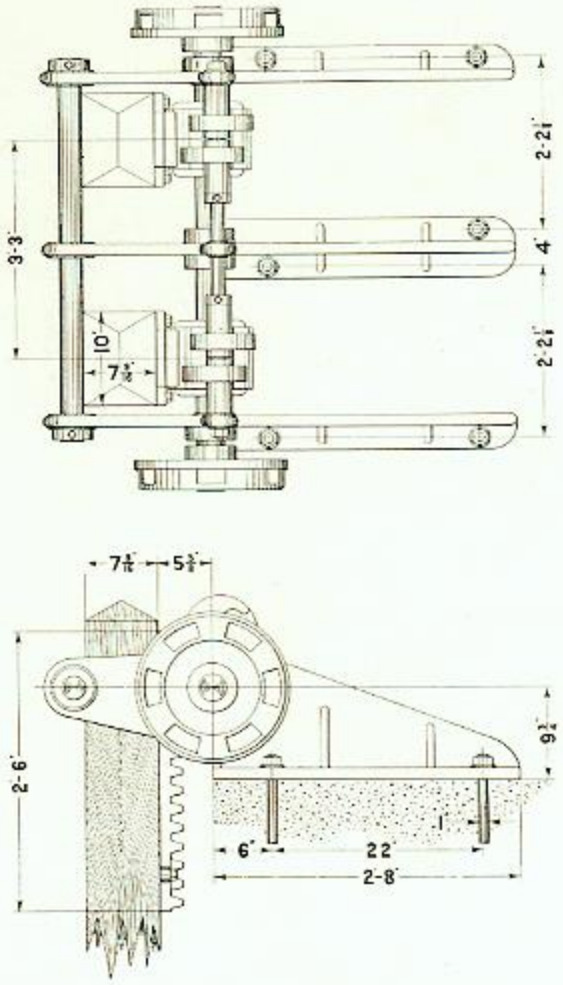
ENGRAVING 197

Dimensions of the style "D" Hoist.
Maximum capacity 3300 pounds.



ENGRAVING 198

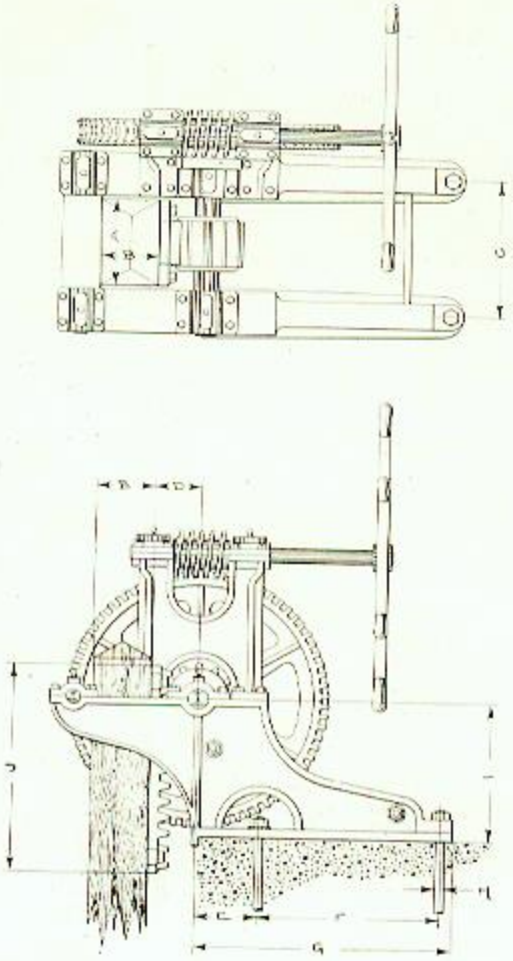
Dimensions of the style "H" Hoist.
Maximum capacity 5,000 pounds.



ENGRAVING 199

Dimensions of the style "HH" Hoist.

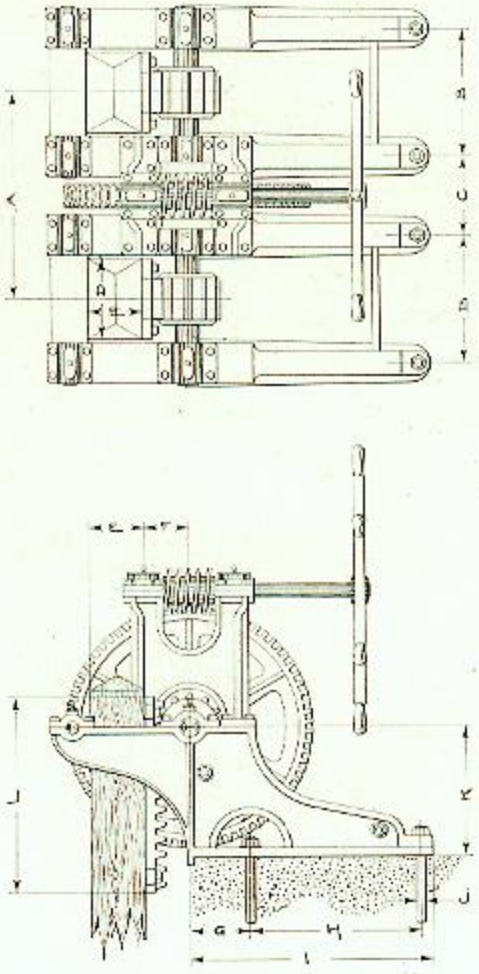
Maximum capacity 10,000 pounds for two stems.



ENGRAVING 200

Dimensions of the style "E" "F" and "L" Hoist.

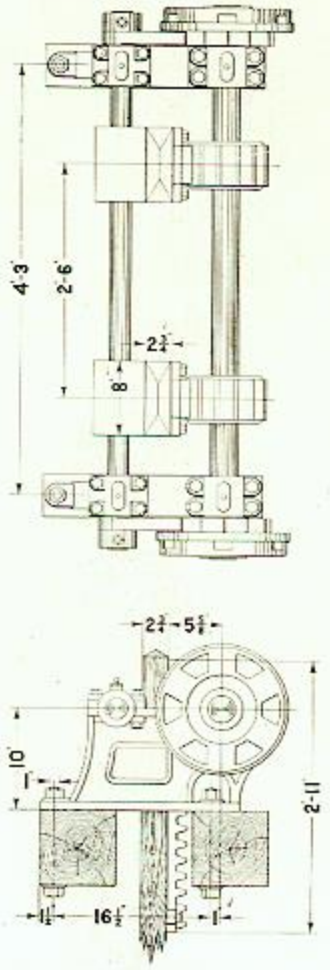
	A	B	C	D	E	F	G	H	I	J	Maximum Capacity
E	12"	8"	19"	6½"	4⅜"	2' 1"	2' 11⅜"	1⅜"	1' 7⅛"	2' 5⅛"	6000 lbs.
F	8"	8"	13⅜"	5⅝"	4⅛"	1' 2"	2' 0"	⅜"	1' 3⅛"	2' 11"	2800 lbs.
L	10"	8"	20"	5¾"	9⅛"	3' 3"	4' 4"	1½"	2' 3"	3' 0"	10500 lbs.



ENGRAVING 201

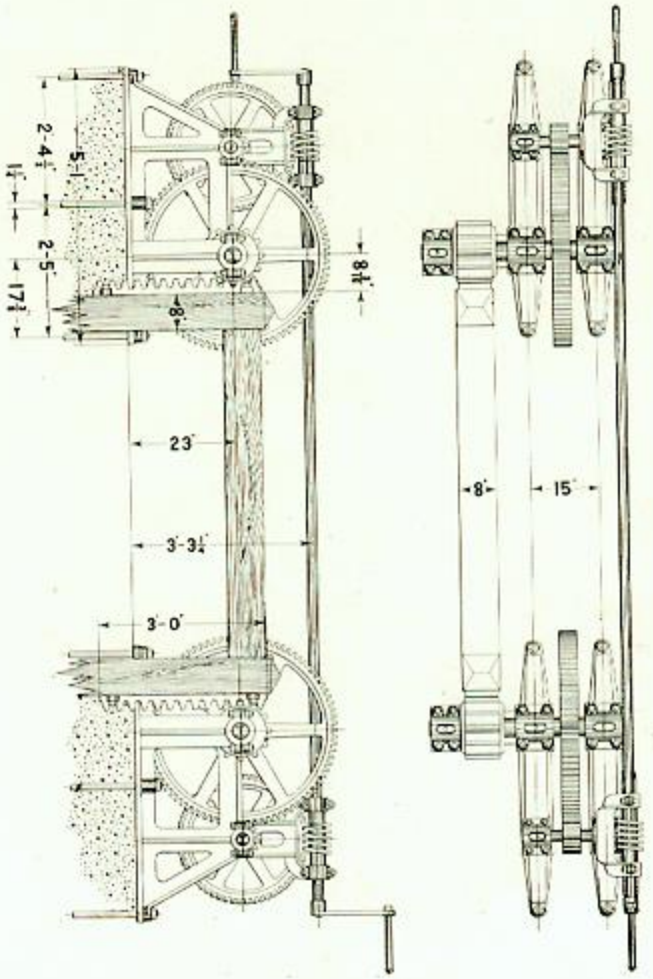
Dimensions of the style "EE" "FF" and "LL" Hoist

	A	B	C	D	E	F	G	H	I	J	K	L	Maximum Capacity
EE	2' 6¾"	19"	11½"	12"	8"	6½"	8¾"	2' 1"	2' 11½"	1½"	1' 7½"	2' 5¼"	12000 lbs.
FF	5' 3"	13 23/32"	18 23/32"	8"	8"	5⅜"	4⅞"	1' 2"	2' 0"	3½"	1' 3½"	2' 11"	5600 lbs.
LL	3' 6"	20"	22"	10"	8"	8⅜"	7"	3' 3½"	4' 2½"	1½"	2' 3"	3' 0"	21000 lbs.



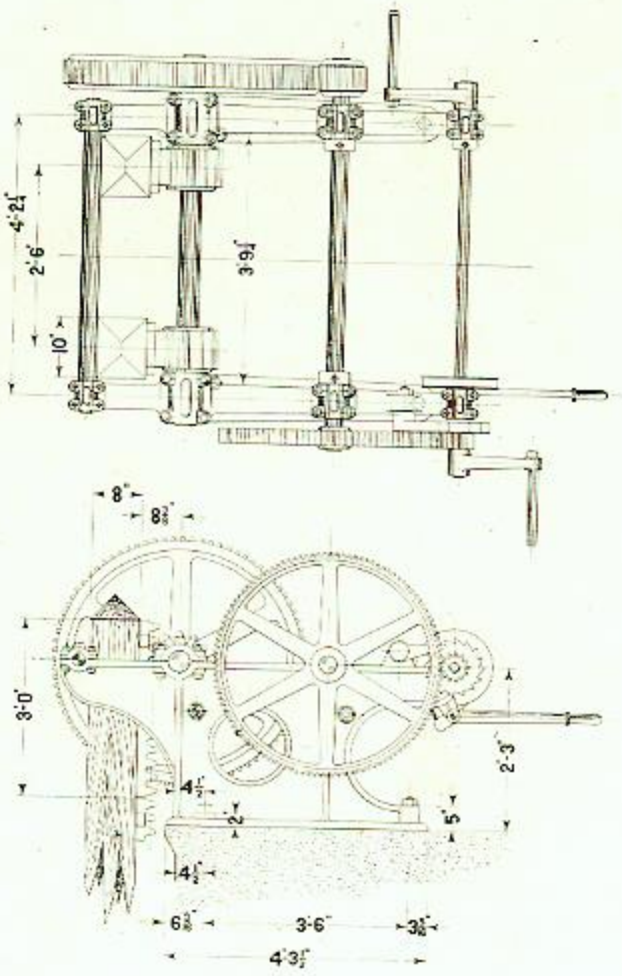
ENGRAVING 202

Dimensions of the style "PP" Hoist.
Maximum capacity 5600 pounds.



ENGRAVING 203

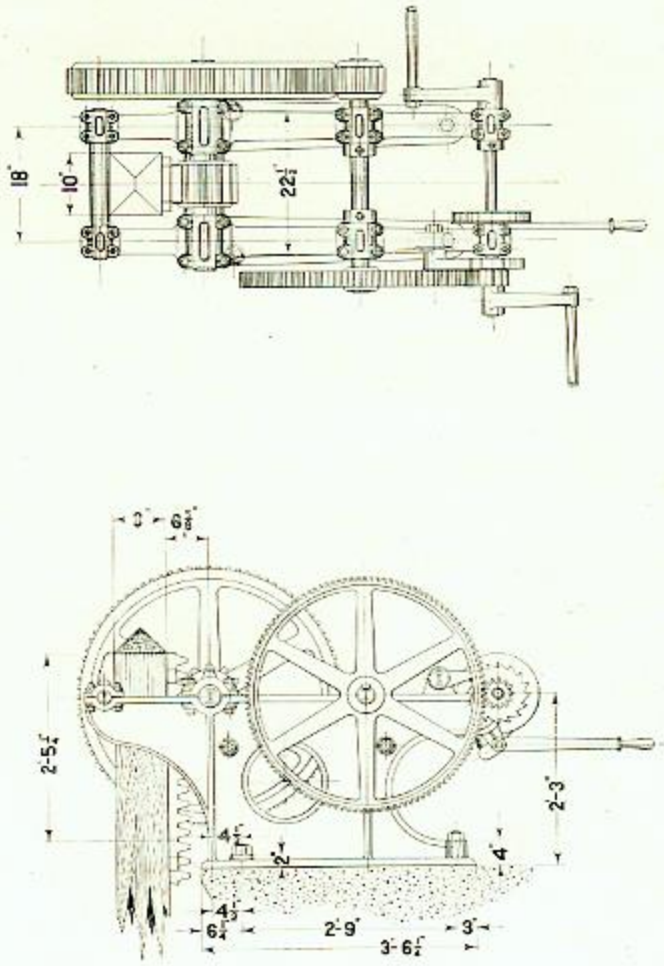
Dimensions for the "O-2" Hoist. The capacity of the above Hoist is 18,000 pounds. The "O-1" Hoist, shown by engraving page 13, is the same capacity as the above Hoist.



ENGRAVING 204

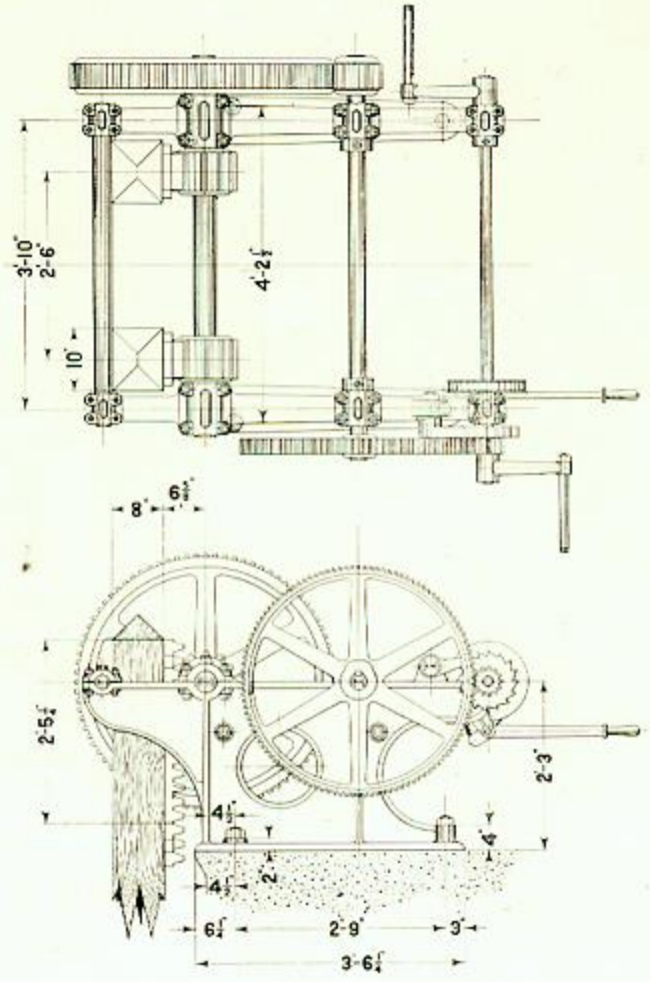
Dimensions of Style "KK" Hoist. Maximum capacity 21,000 pounds.

We also make a Style "K" Hoist similar to the above but with single stem. Maximum capacity 10,500 pounds.



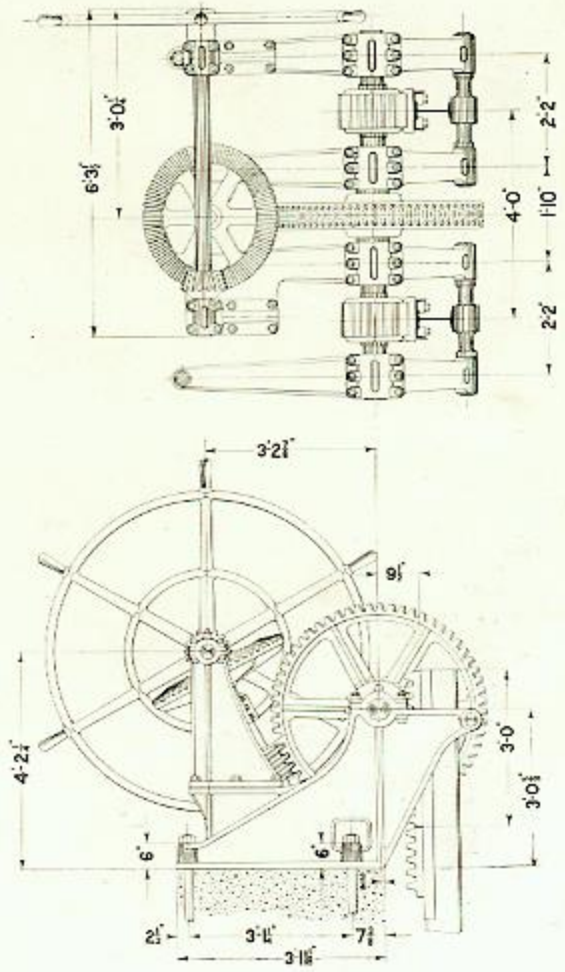
ENGRAVING 205

Dimensions of the Style "Q" Hoist.
Maximum capacity 6,000 pounds.



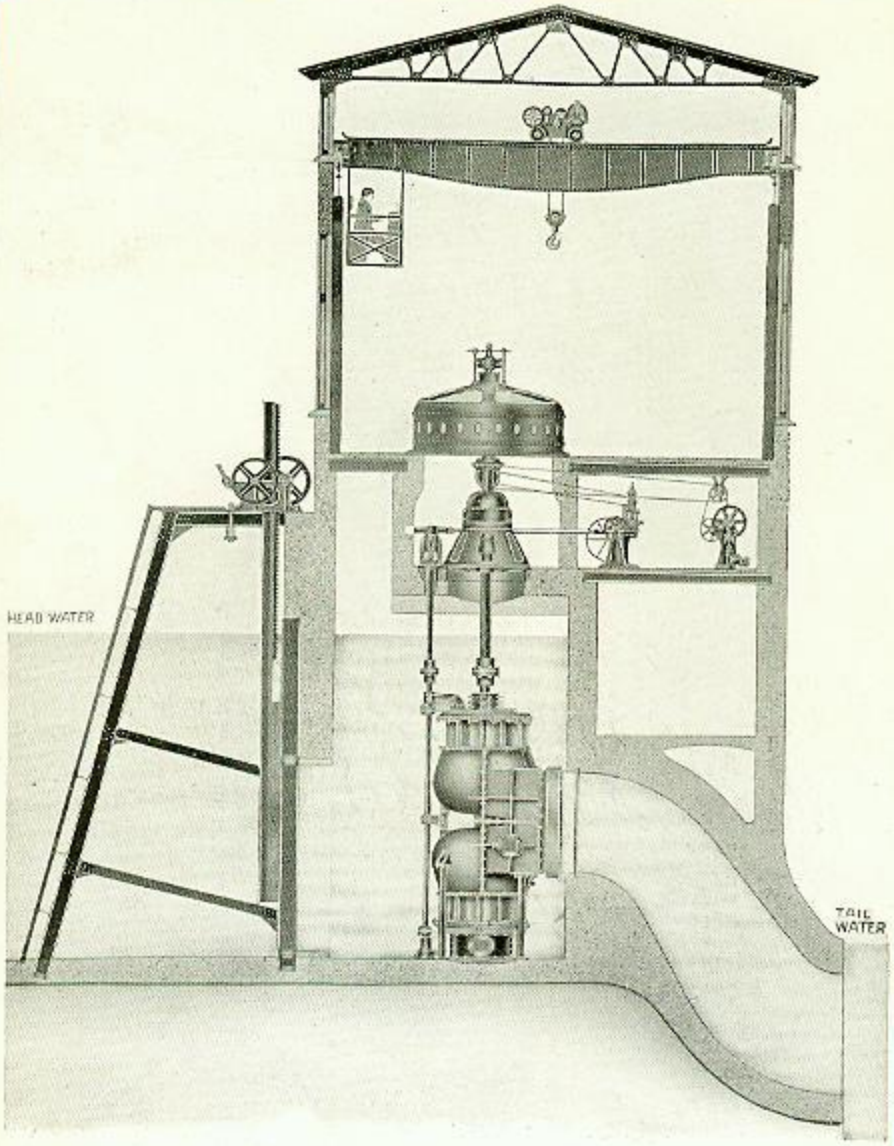
ENGRAVING 206

Dimensions of the Style "QQ" Hoist.
Maximum capacity 12,000 pounds for the two stems.



ENGRAVING 207

Dimensions of the Style "R" Hoist.
Maximum capacity 21,000 pounds for the two stems.



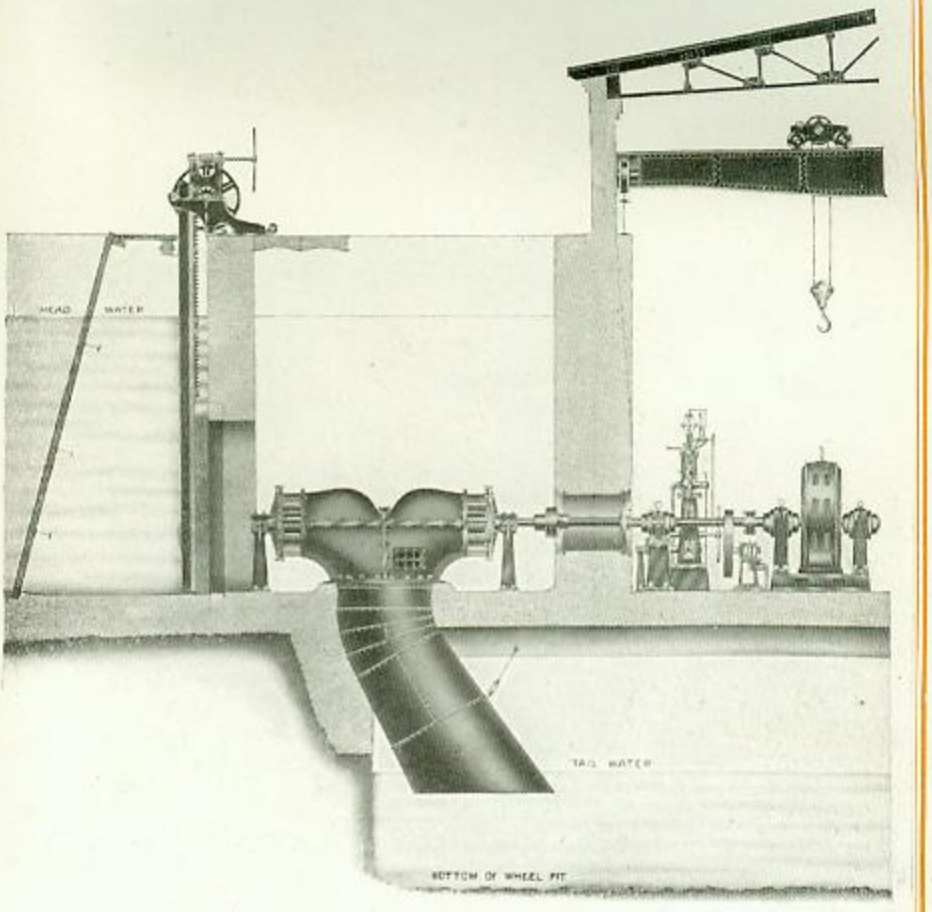
ENGRAVING 208

Pair wicket gate turbines mounted on a vertical shaft, connected to an umbrella type generator. Head 20 feet, 875 H. P., 150 R. P. M.

Four pairs built for Milford Construction Co., Oldtown, Me.

Also a pair of 400 Horse Power to drive an exciter.

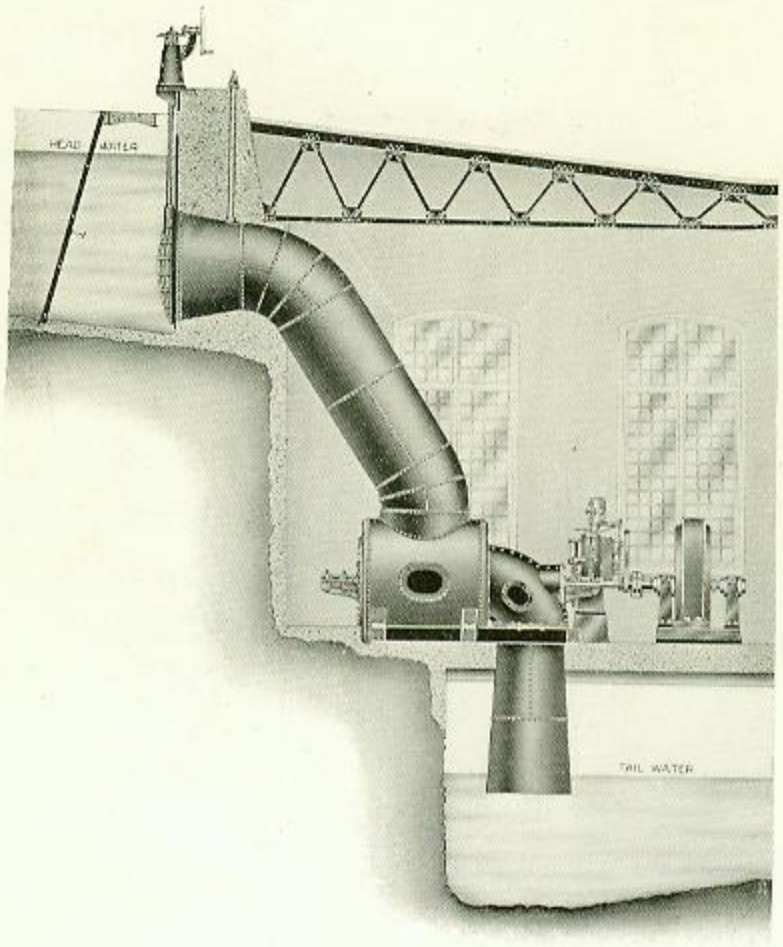
Four pairs 36 inches similarly mounted, built for Philadelphia Hydro Electric Co., Manayunk, Pa.



ENGRAVING 209

Pair horizontal shaft wicket gate turbines mounted on a cast iron draft chest in an open flume, arranged to drive a generator.

We have built thousands of turbines with both cylinder and wicket gates similarly mounted which are driving generators, also machinery in pulp and paper mills.



ENGRAVING 210

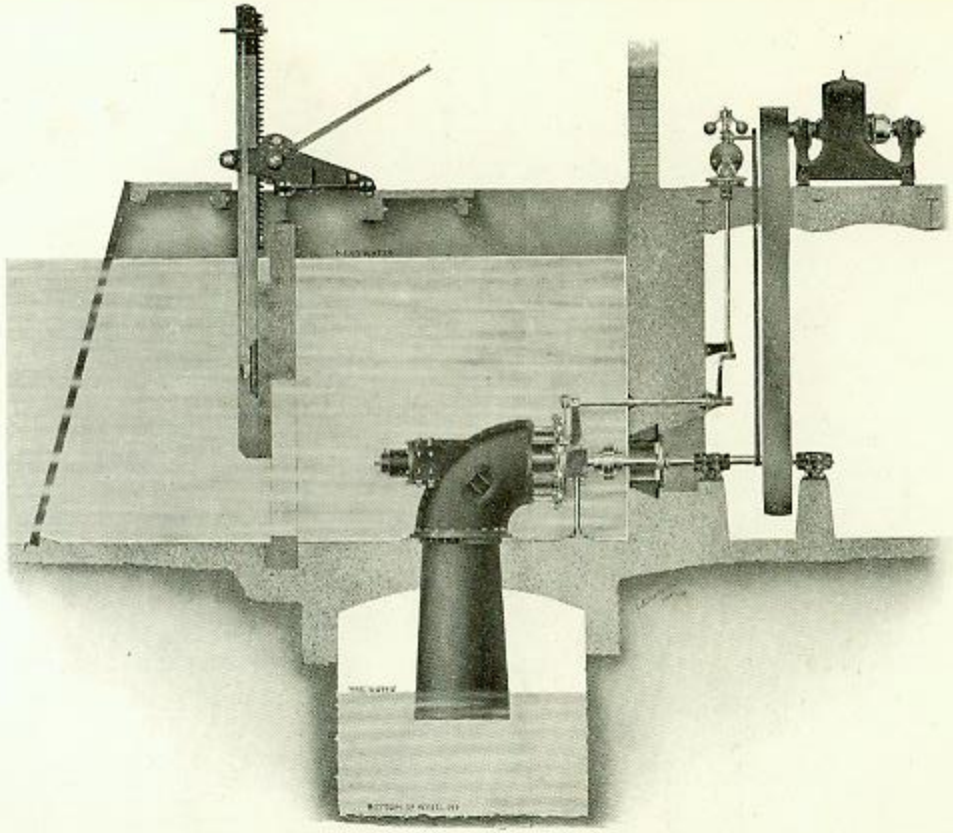
Single turbine incased in steel flume with quarter turn discharge and inlet on top.

We have built hundreds of turbines of similar design operating under many different conditions, driving all kinds of machinery.

ENGRAVING 211

Single Wicket Gate Turbine in concrete flume driving generator.

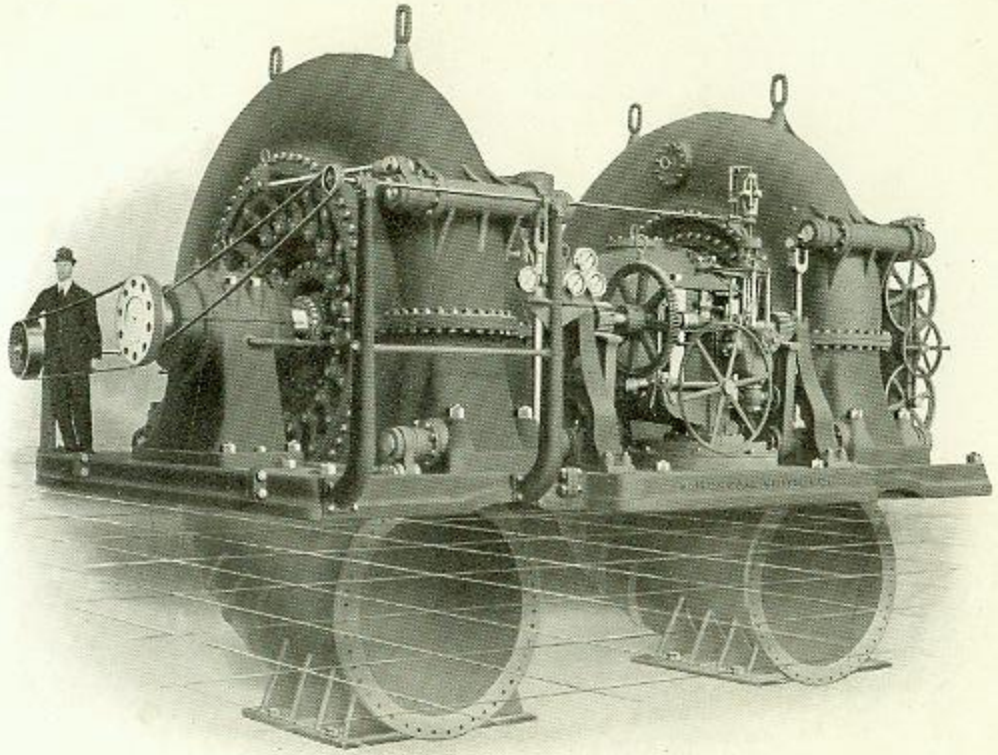
This is a standard setting for a single wheel in open flume. It can be built for direct connection in place of pulley drive.



ENGRAVING 212

Francis turbine unit consisting of two turbines each, mounted in a spiral flume discharging into one draft chest and draft tube. The gate operating mechanism is all on the outside, the bronze runners and steel gates being the only moving parts in the water.

Six units of 43,200 H. P., 225 R. P. M. under 100 ft. head, built for the Great Falls Water Power & Townsite Company, Great Falls, Mont.

We are building four units of similar design to develop 36,000 H. P. under 110 ft. head for the Capitol City Improvement Company, Helena, Mont.

We are prepared to build turbines of this design to operate under heads 600 ft. and lower.